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EDITORIAL NOTES

CALORIFIC VALUE

THE "JOURNAL" endeavours to record in print the thoughts of the Gas Industry, so it is not surprising that recent issues have contained as far as wartime paper restrictions would allow considerable comment from many angles on the subject of calorific value of gas supplied now and to be supplied in increased amount and with greater efficiency after the war. Certain of the arguments advanced either at gas meetings or through contributions "special" to our paper may have appeared to some, as they have seemed to us, to be too much in the present, with the likely needs and possibilities of the future insufficiently realized. We think it unfortunate that still as a background to many suggestions are the peculiar circumstances of particular undertakings. However, we feel sure that, with broad reconstruction after the war—reconstruction planned now, by the way—"peculiar circumstances" will be stamped out to the general benefit of the Gas Industry.

In our issue of Dec. 17 last we published an abstract of an Address by Mr. James Jamieson to the Scottish Junior Gas Association. It was on this subject of calorific value, to which he has for many years devoted deep thought and much experiment; it was fitting that the Address should give rise to considerable discussion, to the reporting of which we have endeavoured, again within wartime limits, to do justice in our pages. What first impressed us in the Address we have mentioned was this question of "peculiar circumstances" as affecting gas supply in Scotland—circumstances which appear to us as very peculiar. Most Scottish undertakings, as pointed out by Mr. Jamieson, are carbonizing similar coals mostly of a caking nature. Yet there are no fewer than 17 different declared calorific values ranging from 375 to 550 B.Th.U. Can this wide range of calorific values be accounted for by differences in carbonizing plant? Sixty-two gas undertakings with vertical retorts supply gas of 12 different calorific values ranging from 375 to 500 B.Th.U. As we have suggested, the circumstances must be very peculiar. What concerns us, as it should concern a Ministry of Fuel if established, is that these parochial differences are a first barrier to progress through regional planning. While there is this incomprehensible variation, no fewer than 130 of the 148 undertakings in Scotland with a published calorific value fall into the four groups of calorific value (500, 475, 450, and 425 B.Th.U.) suggested by Sir Frederick West at the Institution meeting last June. These undertakings cover almost 90% of the total gas make. The largest group is at 450 B.Th.U., in which 52 undertakings making 72% of the total gas appear.

One of the suggestions put forward by Mr. Jamieson was as follows: "Where benzole is fully recovered, Scottish undertakings with low sulphur content in the coal have now found a solution to the sulphur problem and the gas produced contains only 4 to 8 grains of sulphur per 100 cu.ft. Surely such a contribution to the efficient use of gas in flueless heaters and its effect on other apparatus will mean the continued use of these benzole plants as part of the permanent gas purification process." Bearing benzole recovery in mind, Mr. Jamieson, in the earlier portion of his Paper, put it that two calorific values only are required in Scotland—400 and 450 B.Th.U.—and that it would be a fine gesture of Scottish unity and nationalism if one calorific value—say, 425 B.Th.U.—could be adopted. Following which, as indicating the complexity of the problem, he recalled his previous work and some of his previous observations—among them being one made in 1938: "I am doubtful if any progress will be made in the standardization of calorific value until the production and sale of coke are co-ordinated and strictly regulated throughout the whole country."

Regarding the discussion on the Address we do not intend for the moment to say a great deal, but we would call attention to a few of the opinions advanced as having considerable bearing on the problem. If, one speaker argued, the capacity of the mains and services is so near the limit that a moderate reduction in calorific value cannot be effected, this is surely a pointer to the fact that the system requires attention. Another speaker expressed the view that, while the optimum quality of gas for efficient utilization is by no means a critical value, 450 B.Th.U. is the lowest which completely fulfils all domestic requirements, and that 450 B.Th.U. would be the best C.V. for Scotland. Another maintained that one absolute standard calorific value is not essential for the standardization of appliances, and that a calorific value might be adopted within 25 B.Th.U. above or below the standard value to suit local conditions. Another pointed out that a drop of 100 B.Th.U. from 500 to 400 means an increase in volume of 25% and an increase in pressure drop of 90% to deliver the equivalent amount of heat. Yet another gave his view that the present-day trend of declaring lower calorific value gas is merely an expedient to offset benzole extraction, to cope with the poor quality of coal now obtainable, or because of the non-availability of oil for carburetted water gas plant.

Throughout this mass of thought we retain as a dominant impression Mr. Jamieson's 1938 doubt whether progress in the standardization of calorific value would be made until the production and sale of coke were co-ordinated and strictly regulated over the country as a whole; and this brings us to the article by Dr. G. E. Foxwell published in our issue of Jan. 14. In this he asked whether the permissible declared calorific value should be 400 B.Th.U. or whether lower figures should be permitted, and he proceeded to discuss the relative costs of production and distribution of 350 and 500 B.Th.U. gas, while expressing the opinion that to-day gas and coke are complementary smokeless fuels which when used together enable the products of the Gas Industry to be utilized to supply the whole heat required for even small houses occupied by those of small incomes, and that in any proposal involving new methods or standards the criterion must be the cost to the consumer of performing a given service in his house. We would underline this. On the set of values taken as a basis by the Author, and with which we do not quarrel, he finds that if the price of coke at works is less than 90% of the cost of coal at works, both per ton, an unfavourable coke position can be rectified by employing the dual gasification process and producing gas of 350 B.Th.U., and that for low pressure systems the increase in distribution costs incurred by changing from 500 B.Th.U. gas to 350 B.Th.U. gas would be negligible. We are in general agreement that there are no physical or chemical characteristics in 350 B.Th.U. gas that make it inferior to 500 B.Th.U., and that to make total gasification attractive in the light of the known and probable demand for coke *when properly marketed and prepared*, a cheaper process is desirable than the dual process he discussed in his article. His analysis emphasizes once again the part which the revenue obtainable from coke plays in making possible the supply of cheap gas; and we think that the price he takes for coke to make out anything of a case for the cheap production of 350 B.Th.U. gas is very pessimistic indeed—to our mind unnecessarily pessimistic. And in regard to distribution costs we feel that we should visualize a future Gas Industry supplying a far greater

amount of heat energy in gaseous form than in the days prior to the beginning of the present war.

GAS IN POST-WAR HOMES

IN these columns a few weeks ago we referred to the possible role of gas in the post-war home, the planning of which is now being considered with some animation throughout the country. We suggested that the Industry, already contributing greatly to the amenities of the home, can contribute much more in the future if it works in closer contact with the architect and responds to new developments. The Industry must show unmistakably that it is capable of meeting new and different requirements. It should have ideas to unfold carrying overwhelming conviction as to its place and its service potentialities in the future pre-planned home. Many ideas concerning the future home are floating in the air—some good, some indifferent, and some, to our mind, definitely bad. What we consider retrograde is the suggestion that houses of the future might be chimney-free—in other words, that flues to rooms are unnecessary. We believe that models of houses without flues have actually been designed; we are convinced that, generally speaking, flues are not only desirable but also necessary in the interests of health. The Gas Industry has a big stake in the future home, and its views on ventilation should be properly aired and heard in the right quarters. The provision of flues, it may be said, favours gas heating. We maintain that it favours every type of heating if due regard is paid to hygienic principles. The Industry has considerable data on the subject and should see that the information is widely disseminated; we think that every gas undertaking has a duty in this matter. The provision of flues is a principle of healthy ventilation which should not be violated.

Before the war it was argued in favour of electricity for local heating that building costs could be much reduced, since no flues were required to carry away the products of combustion of fuels. Now the desirability of omitting flues has always been questioned on hygienic grounds, and the opinion that satisfactory ventilation cannot be obtained with air-bricks let into the wall was gaining strength even among bodies in whose interest it would appear to be that flues should be omitted. We do not think we need reiterate much of the evidence adduced from a large number of investigations into the matter which have been carried out during the past twenty years, but we may put on record once again at this stage a statement made by that most important Medical Advisory Committee which reported in 1935 ("JOURNAL" of Aug. 14, 1935). It was this: "The Committee has examined all the available evidence on the ventilation of flueless rooms and the warming of them by flueless heaters. Since the air change in such rooms may be as small as 1 per hour it is open to serious doubt whether a degree of ventilation of this low order can be regarded as satisfactory whatever the nature of the heating, and *whether this modern tendency in housing construction is, from the point of view of health and comfort, in the best interests of the community*." The italics are ours. We cannot think that the principles of hygiene in this regard have changed since 1935, and it would be a thousand pities if future homes were planned in defiance of a proved premise—adequate ventilation.

In planning for the future sight should not be lost of the main requirements for a pleasing and invigorating environment. Of course, the amount of fresh air required to keep body odours from becoming perceptible varies with the density of occupation and with the cleanliness of the occupants, but a figure of about 1,000 cu.ft. per person per hour is probably not far wrong as a rough average. This alone is a powerful argument for the use of flues. For example, four people in a room of 1,500 cu.ft would require a minimum of nearly three air changes an hour—a change readily provided by a gas fire. Work carried out at the London School of Hygiene and Tropical Medicine just before the war—unfortunately the investigation had to be suspended—showed among other matters that the supposed saving to be made by constructing rooms without flues may be more than nullified by reducing the number of occupants that the room may hold if due regard is paid to health and comfort. Another important investigation undertaken just before the war resulted in the following conclusions regarding comfortable conditions: There should be adequate air movement; the air movement should be variable rather than uniform; the relative humidity of the air should be reasonably low. Again indicating the need for flues.

With post-war planning under such earnest consideration we repeat what we said in 1935—that the flueless room is bad for the public, and that this proved fact should be made known and emphasized on every possible occasion until the building industry is forced to provide only dwellings with adequate ventilation.

Personal

Mr. CHARLES HULME, M.I.Mech.E., Engineer and General Manager of the Uxbridge, Maidenhead, Wycombe, & District Gas Company, is retiring at the end of February. Mr. Hulme served his pupilage at Widnes Corporation Gas and Water Works under Mr. Isaac Carr. There he became General Engineering Assistant and Chemist until appointed Assistant Manager of Colne (Lancs) Corporation Gas-Works. After 18 months he became Deputy Engineer and Manager of the Wigan Gas-Works and remained there until 1906, when he was appointed Engineer and Manager at Uxbridge.

His successor at Uxbridge is Mr. J. H. Dyde, M.Sc., who now holds a similar position with the North Middlesex Gas Company.

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Mr. THOMAS E. PARRY, Engineer and Manager of the Fleetwood Gas Company since 1938, has been appointed Engineer, Manager, and Secretary of the Cannock District Gas Company, Staffordshire (a constituent undertaking of the Severn Valley Gas Corporation, Ltd.).

Obituary

The death occurred suddenly on Jan. 11, following an operation, of Mr. F. O. MANNING, Secretary and Director of Meters, Ltd. Mr. Manning commenced his business career with the firm, and on the death of his father in 1912 he succeeded to the position of Secretary. In 1928 he was elected to a seat on the Board, which position he occupied to the time of his death. Of a quiet, unassuming nature, he was respected by all with whom he came in contact.

Letter to the Editor

Pitch as Fuel

DEAR SIR,—I notice in your issue dated Dec. 31, 1941, that you make reference to recent developments in indigenous tar fuels; and I would like to clarify a statement which you make in this connexion. I refer to your remark that these liquid fuels are applicable to "boiler installations throughout the country." It is true to say that a comparatively small number of boiler installations are being fired regularly either with pitch or with creosote/pitch mixture, but such installations are the exception rather than the rule.

In the tar distillation industry in the past many boilers have been fired with tar products, but having established the necessary technique it is now felt generally that these practically ashless liquid fuels can in the national interest be much more advantageously employed in the substitution of imported liquid fuels.

Since the beginning of the war, the Petroleum Pool Board has effected a considerable number of substitutions and replaced petroleum oil with a standardized grade of creosote/pitch mixture in a great number of industrial oil-burning furnace installations, and in so far as the more viscous tar fuels are concerned, including pitch, it is felt that these materials, too, have a specialized application wherein their particular chemical and physical virtues may be used to the maximum advantage in furtherance of our national effort.

Beech Tree Corner,
Riding Mill,
Northumberland.
Jan. 15, 1942.

Yours faithfully,
E. BRETT DAVIES.

A Meeting of the Board of Examiners of The Institution of Gas Engineers will be held on Wednesday, Feb. 4, instead of Wednesday, Feb. 18, as previously arranged, at 1.30 a.m.

Presentation to Dr. H. G. Colman

Dr. Harold G. Colman's retirement from membership of the Refractory Materials Joint Committee of the Gas Research Board and the British Refractories Research Association was made the occasion of a happy little ceremony at a meeting of the Committee last month.

At an informal lunch before the meeting, the Chairman (Mr. T. F. E. Rhead) said they were there to honour a famous chemist and a great gentleman. He mentioned his contact with Dr. Colman at the Manchester University Chemical Society in 1910. He had also followed in his footsteps in the delivery of the Carbonization Lectures at Leeds University, but it took both himself and Dr. Hollings to carry out the work Dr. Colman had done single-handed.

Dr. Colman, he continued, had a brilliant career at Manchester University under that famous chemist Sir Henry Enfield Roscoe, graduating B.Sc. in 1887. During the next four years he carried out research at Manchester, Würzburg, and Strasbourg, publishing several Papers on organic chemistry, either alone or with Dr. W. H. Perkin, and also taking a Ph.D. degree. This was followed by two years as personal assistant to Sir Henry Roscoe. He was part editor of Roscoe and Schorlemmer's *A Treatise on Chemistry*.

Dr. Colman entered industry as Chief Chemist of the Birmingham Gas Department in 1892, where he remained until 1903. He made a very high reputation in Birmingham, and the General Manager (Mr. A. W. Smith) had asked the Chairman to convey his sincerest greetings and wishes for a happy retirement. In 1903 he decided to set up on his own, and soon became a highly esteemed and trusted consultant, and was called in to give his opinion on, or carry out, large-scale tests of plant on many occasions, both business and legal. He took his D.Sc. degree at Manchester in 1908. Dr. Colman was greatly sought after on professional Councils and Committees, among which he took a very keen interest in the Institute of Chemistry. His very extensive chemical knowledge embraced both organic and inorganic chemistry. His interest in the former was still manifest in his work as assessor to the Midland Tar and Benzole interests, and the latter in his long association with the refractories world.

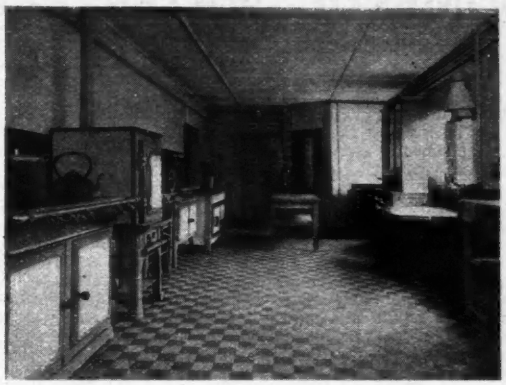
The Chairman then presented to Dr. Colman a complete set of the Reports of the Refractory Materials Joint Committee from 1910–1940 in two volumes, bound in blue leather in keeping with the Institution's Transactions, and a piece of pottery by Bernard Moore, being a Gourd vase about 16 in. in height, decorated in a Chinese prunus-blossom design in rouge flambé and grey. The Chairman, on behalf of those present, asked Dr. Colman to accept these mementos, and wished him many years of good health in which to enjoy a well-earned retirement.

Mr. A. T. Green said it was a particular privilege to be associated with this presentation. Dr. Colman had for many years been an admirer and a true friend of the late Dr. J. W. Mellor, through whose initiative and capacity the British Refractories Research Association had been so well founded. Dr. Mellor invariably recognized the tremendous help he had received from such stalwarts as Colonel C. W. Thomas, Mr. Frank West and Dr. Colman. Their guest had always shown a very live interest in refractory problems, and when he became Chairman of the Committee he infused his enthusiasm into the programme of work with evident advantage to the Gas Industry and to the manufacturers of refractories.

Dr. Colman, in reply, expressed his deep gratitude. In regard to the early history of the Refractory Materials Joint Committee, he pointed out that this itself formed one of the earliest of the tributaries which joined with other streams in the formation of the British Refractories Research Association, and was also a very early case of manufacturers and users joining together for joint research. The original spring which formed this tributary was the Paper on "Refractory Materials" read before the Institution over 30 years ago by Mr. F. J. Bywater. Following the reading and discussion of this Paper and with the collaboration of the then President, Mr. J. W. Helps, and of Dr. Mellor, the Joint Committee was started, with Mr. Helps as Chairman, Mr. Bywater as Hon. Secretary, and Dr. Mellor as Technical Adviser. The work of the Joint Committee had been continuous since that time.

The Meeting of the Chairmen's Technical Committee of The Institution of Gas Engineers, provisionally arranged to be held on Tuesday, Jan. 27, at 2 p.m., has been cancelled.

The Hundredth British Restaurant



The completion of the hundredth British Restaurant in one of the Home Counties, fully equipped by Radiation Ltd., is still another indication of the way in which gas is being called upon to support the national war effort on the food front. Emphasis of this achievement is supplied by the fact that orders for no fewer than 40 further installations are already in hand.

Our photograph shows part of one of the last two kitchens.

B.C.G.A. South-Western District Meeting

A letter from the Chairman of the District to the President of the Board of Trade stressing the need for fuel economy in Service Departments was one outcome of a meeting of the B.C.G.A. South-Western District held recently at Exeter.

Among the subjects discussed at the meeting were the Emergency Executive Committee's recommendation to the Chairman of the British Gas Federation on post-war planning, which was warmly approved, and the Committee's recommendations for the strengthening of the constitution of the Districts. These were also unanimously approved, and Mr. R. C. Taylor (Torquay) was elected Chairman of the newly-formed District Management Committee, with Mr. W. T. Lane as Hon. District Secretary. It was agreed that the District members on the B.C.G.A. General Committee should form this District Management Committee.

In the discussion on post-war planning, members agreed that it was most important for the Gas Industry, individually by Districts and nationally, to take all steps to prepare itself for the post-war period.

The meeting considered the current activities of, and the publicity material produced by, the B.C.G.A., which members endorsed as being of assistance in the maintenance of consumer goodwill during the war.

An Advertisement of 1896

We were interested in seeing the other day a very early advertisement of the Davis Gas Stove Company, Ltd., on cooking by gas. It was published in the Waltham Abbey *Weekly Telegraph* of June 19, 1896. It occupied a whole single column and was headed by a wood engraving. The advantages of cooking dinner for a family by gas for twopence were set out, considerations of economy, cleanliness, speed, convenience, and labour-saving being emphasized. At that time the cookers were being fixed by the Waltham Abbey and Cheshunt Gas Company free of charge at a rental of 2s. 6d. to 3s. a quarter; and it was mentioned that all such "stoves" were giving "universal satisfaction" in service.

Design in gas cookers—and in the dresses worn by cooks and housewives—has changed much since 1896, but the convictions expressed in that early advertisement have stood both the public and the Gas Industry in good stead.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

DOMESTIC WATER HEATING—SECOND THOUGHTS

By LEOPOLD FRIEDMAN

I HAVE read with interest, and have given thought to, the comments of Mr. F. Brooks in the "JOURNAL" of Dec. 14, and I have discussed this fundamental aspect of post-war planning with, among other authorities, Mr. T. G. Noble. Perhaps you would allow me to take this opportunity of making a general reply covering some of the more cogent points.

The intention of my original article was to invite discussion on domestic water heating from the point of view of national and household economy on wide and fundamental bases. The supply of good, cheap gas, delivered through adequate distribution systems—with, by the way, an entirely new approach to the problems of utilization of gas and with regard to proper fitting and maintenance—is of great importance to post-war planning. The consumer is not only the ultimate purchaser but also the judge of the service offered. He is a wage earner; his potential capacity for purchasing improved services has to be considered.

I have the feeling that Mr. Brooks may have failed to appreciate the main theme and intention of my suggestions. Where there are a number of competing systems and types of apparatus the problem should be considered from various angles:

(1) Practically as well as ethically it is necessary to find out what the consumer really needs. Wants are sometimes not expressed or understood clearly. Sometimes they are suppressed because satisfaction appears impossible. Education is necessary to evoke these hidden wants and to point to the possibility of their fulfilment.
(2) How much money can the user afford to spend upon these needs?
(3) How fully can these needs be met?
(4) Actual cost to the user, to the supply undertaking, and to the manufacturer.
(5) Manufacturing problems.
(6) Distribution problems.

Reconciliation of the possibilities of demand and supply necessitates the fullest consideration of national fuel economy and the family budget. The deliberate intention of my comments was to raise the subject for discussion on to as wide a platform as possible. I wished to avoid detailed discussion regarding the merits and demerits of individual appliances. Only one very narrow segment of these problems can be covered in one Paper. Therefore valid criticisms as, for example, that district heating has not been considered are fully recognized.

My intention was to discuss the subject in the light of experience and to help to solve this complicated problem of national fuel organization without personal bias. The views on electricity fully conform to those stated by the late Dr. Bernard Friedman in Manchester in 1932 ("Fundamental Principles of Water Heating by Gas Fired Appliances)." Criticisms since expressed seem to indicate that the views put forward in that Paper are well balanced.

Scrutiny of the bibliography will show that most of the information has been obtained from recent publications. A fuller list is appended. Should any more recent data be available the Author would be glad to have notification; his desire is to assist.

Turning to details, the estimates for hot water installations given in Table III are surely explained in the succeeding paragraphs; they refer not to existing installations, as some critics may have assumed, but to installations which ought to be made. We should try to understand the *Weekly Expenditure of Working Class Households in the United Kingdom in* 1937–1938 (His Majesty's Stationery Office, published 1941), from which Table V is merely an abridged extract. The suggestion that "storage water heaters can supply and are supplying economically the needs of a large proportion of those under the £200 per annum income group" was not contested in my comments, but it appeared that instantaneous water heaters could satisfy the needs more economically.

Criticism has been levelled at the number of gallons of hot water per day assumed and the temperature rise required. There is some justification for the figures chosen. This is shown not only in my article, but also in other sources consulted with regard to average fuel consumption (mainly coal) and various household budgets. The average temperature rise of 65°F. (*mean* outlet temperature 110°F., *not maximum*) has been taken with due regard to the fact that the main quantities of water for hand washing, food preparation, washing woollens, cleaning windows, &c., are used at 70°–80°F., while the user restricts the quantities required at higher temperatures because of economy in time and fuel even when this hot water is obtainable without having to boil kettles or to stoke up big fires and wait for really hot water.

The unfortunate convention of expressing the output of instantaneous gas water heaters in terms of gallons per minute raised through 40°F. has always—at any rate by myself—been deplored. In fact I raised this very point on numerous occasions during committee meetings held by the Gas Industry in connexion with "Installation and Regulation of Gas Water Heaters." Without referring to the statements of any particular manufacturer of instantaneous gas water heaters, I would suggest that the average householder would (as Mr. Brooks agrees) prefer to purchase a water heater supplying 3 gallons per minute raised through 40°F. rather than one supplying 1.2 gallons per minute raised through 100°F.—overlooking the fact that the output is the same. If only for this reason the existing convention should be revised.

The criticism that modifications of assumptions would alter the results was foreseen, and for that reason tables were added as an Appendix to show the effect of such alterations. Water statistics quoted in my article show that families with less than £125 per annum are likely to use the amounts given in Table II—*i.e.*, 70% of them will use 20 gallons per day from the sink heater to give really hot water to supplement the inadequate supplies from the kitchener, and that 0.01% may use 60 gallons per day from sink and bath water heaters. The next income group (£125–£200 per annum) use slightly more hot water. For the higher income group of £200–£500 it is assumed that all families will average 60 gallons per day.

No case, to my knowledge, is known where gas is supplied at lower rates for circulators than for instantaneous heaters, and it is suggested that some confusion may exist here with industrial rates for central heating boilers which are necessary to put gas on a competitive basis for large space-heating requirements.

The instantaneous multipoint was accidentally omitted from Table IX, but the figures of 4.96 therms, equivalent to 5 hrs. 5 mins. per week, do not invalidate the argument.

Mr. Brooks rather stressed distribution difficulties, although he admitted that the gasholder to a certain extent offsets peak difficulties. I think it well to leave to the Gas Industry the question of the gasholder and its ability to distribute its commodity effectively.

Mr. Brooks considered 10s. per annum for maintenance to be a low charge. I would like to quote a well-informed critic as follows: "The costs per week are of the right order, on the whole on the high side compared with the possibilities, especially maintenance costs. But probably the Author does well not to overstate the case. Some costs for maintenance of back boiler and electric apparatus should surely be included? Why is the gas storage system omitted?" In fact, the figures given were on the high side for instantaneous water heaters purposely, not to overstate the case. For the same reason the maintenance costs for other systems were omitted. The gas storage system is omitted, being in no way superior to the electric storage heater. The final figures for all-in costs (Table X) lie between the two. And surely, Mr. Brooks, you do not suggest that anyone will go without smoking or drinking or transport to work, in order to have a hot towel rail in the bathroom?

The actual figure for fuel and light (Table VII) taken from this source is 6s. 5d. per week. Other sources give figures ranging from 3s. 8d. to 6s. per week and are taken from up-to-date social surveys, such as Mr. Rowntree's, published in 1941. These latter figures refer to normal expenditure of families in the lower income groups, the lowest figure of 3s. 8d. having reference to minimum needs. Again, in reference to smoking, sports, and travelling, the Ministry of Labour and National Service Report gives amounts for travel (to work) as 2s. 3d. per week, holiday expenditure 7¾d. per week, drink 9¼d. per week, tobacco and cigarettes 2s. 6¼d. per week, reducing other expenditure not detailed, but no doubt essential, to 2s. 7d. per week.

With any form of storage heating in a small house, the deciding factor is the number of B.Th.U. which can be available from storage at any given times, and it is fully agreed that the tap temperature should be 5–6°F. above the final bath temperature.

At the beginning of his comments Mr. Brooks expressed surprise that installations of sink heaters and bath heaters should exceed those of multipoint heaters. Later he himself suggested the answer—namely, that it is uneconomical "to draw a small volume, say, one pint, of really hot water from a multi-point heater." The realization "that the maximum output capacity of the multipoint is generally about three times that of the circulator for a similar household" is agreed. It is one of the subordinate themes of my article.

The installations (Table VIII) were precisely similar in the same house with the same household, each specified and installed (without interference) by a gas company and an electrical supply undertaking respectively. The research staff of the gas company had full access (and, indeed, inspected the circulator installation without expressing disapproval). Mr. Brooks' figures for the circulator, in which he calculates an efficiency of 48.75%, and arrives at the conclusion that the circulator is cheaper than the multipoint heater, rest on a calculation. My figures rested on actual observed installations. Mr. Brooks' estimation is unjustified since continuous heat losses occur from the heat transferring surfaces of the circulator, from the outside of the circulator, from the flue ways, and from the flow and return pipes, and to some extent even from the gas and other connexions. The calculations should therefore be 75% of 40%, this comparatively

small difference (65% − 40% = 15%) being made up of the heat losses referred to between the intermittent periods of using hot water in the normal household.

I would like to refer to Miss Hebden's contribution in the "JOURNAL" of Jan. 14, which is appreciated as showing general agreement. While business men as such may not understand the housewife's problems, the engineer and designer of domestic apparatus has of necessity to make a first-hand study if he is to be a success. Upsets of the home due to illness and other causes substantiate the argument for unlimited hot water on tap at any time without waiting. The temperature of hot water generally agreed for removal of grease from plates, &c., is 130°F., and that for the pasteurization of milk is 145°F. It is felt that the provision of water heating by the landlord may be desirable, but it should be remembered that from the financial point of view the cost of the service is recoverable in the form of rent.

The use of the well established high capacity storage gas water heater is fully agreed in my comments in the "JOURNAL" of Dec. 3 as desirable wherever financial considerations permit.

New developments such as district heating were omitted from my article. From the broad point of view of an engineer and scientist one cannot preclude developments which may completely revolutionize existing conditions, but my intention was—and remains—to deal with the immediate problems arising in the first decade or two after the end of the war.

Of course it is true that many people do not complain of their particular installations, but this does not prove that they are content. They may know of nothing better. In any case it is no argument for allowing things to stagnate and for neglecting to marshal one's forces and efforts for the future benefit of the community. Further development of this train of thought is not within the scope of my present remarks.

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"Silent Beam" Gas Fire

It is well known to the Industry that over a period of years Radiation Ltd. has devoted much attention to the use of luminous flames in gas fires, and the knowledge and experience gained have enabled many technical problems to be solved. The most recent development in this direction—the "Silent Beam"—was made available to the public shortly before the outbreak of war. It was described in the "JOURNAL" for Jan. 17, 1940. Further acquaintance with this fire has confirmed the favourable forecast expressed at the time. Many "Silent Beam" fires are now in use distributed throughout the country, and although the quality—calorific value, specific gravity, and so forth—of gas varies from place to place, the performance of the fire, as a result of the technical features provided, has, we understand, been found to be admirable and remarkably consistent, and the flexibility of the luminous flame burner has proved of great practical value under wartime conditions of gas supply.

Probably the chief appeal of the "Silent Beam" both to gas undertakings and to the public lies in its two main characteristics of new and pleasing appearance, together with its complete silence in use. Novelty is always an attraction, particularly when combined with additional advantages. To keep abreast of developments in competitive fields, the Gas Industry requires a steady stream of new and improved appliances, and in this respect the "Silent Beam" fire marked a notable achievement. Its glowing appearance and the "soft" quality of its warmth have been particularly remarked on, and its distinctive feature of silence—not requiring any qualification such as "almost" or "nearly"—has been found a particular boon when the fire is used where quiet is so necessary, for example in the study or sick-room. To gas undertakings the "Silent Beam" appeals because, after the initial adjustment, no further regulation is required, and practical experience of more than two years has, the makers tell us, proved that maintenance is negligible.

The luminous jets cannot become choked with, for example, fluff from blankets or the dust from carpets; many "Silent Beam" fires have been fixed purposely in very dusty positions and their performance has been fully maintained. Freedom from choking with blanket-fluff is a particular advantage in the case of fires used in hospitals and nursing homes, where previous experience has shown that the problem of avoiding trouble due to this cause is a very real one. Further, neither the combustion chamber nor burner is affected by falls of chimney debris. The front refractory structure has been welcomed as affording a pleasing departure from the conventional vertical radiant, and in service has proved notably resistant to thermal and mechanical strains. In developing the fire, particular attention was devoted to the comfort factor of the radiant heat emitted, with which subject Radiation Ltd. is so prominently associated. The warmth is rich in beneficial short infra-red rays and to this its "soft" nature is so largely due.

Experience gained with new appliances such as the one under discussion will help greatly on the return of peace, when we can go ahead confidently in offering to the public improved heating appliances of the nature the satisfactory performance of which has been established.

Liquid Level Control

The "Lectralevel" liquid level control system is described in a new leaflet issued by Londex, Ltd., 207, Anerley Road, S.E. 20. The system, which works without float, is used for automatically pumping out, pumping in, or maintaining the level of liquid in a container. The leaflet also gives some details of the new Londex flow remote indicator, and the Londex automatic liquid level control for liquids and gases under high pressure.

Copies of the following recently published *War Emergency British Standard* 994: 1941 *Centrifugal and Axial Flow Pump Specifications and Data Required for Estimates and Orders* may be obtained, price 2s. each, from the Secretary of The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1.

The Ministry of Works and Buildings recently called together a large group of manufacturers who were not represented by any Association, because they were anxious to collate the total output of the country. From this widely represented group the National Association of Kitchen Equipment Manufacturers has been formed. Any manufacturing firm interested can obtain full particulars of this Association from: The Hon Secretary, Mr. G. Percival Ellard, 319, Green Lane, Norbury, S.W. 16.

Calorific Value of Gas

Discussion on the Address by Mr. James Jamieson to the Scottish Junior Gas Association.—See "JOURNAL" of Dec. 17, 1941, p. 426.

(*Continued from p. 64*)

Mr. **S. Smith** (Paisley): When considering the reduction from 450 to 425 B.Th.U. in Paisley some months ago, three principal factors were taken in account: (*a*) Benzole extraction, (*b*) coal and gas oil position, and (*c*) coke markets. From our experience it was found that to extract two gallons per ton of coal and maintain 450 B.Th.U. on the town it was necessary to make an unstripped gas of approximately 466 B.Th.U. In view of the coal, oil, and coke market situation it was decided to apply for authorization to reduce the declared value to the next "25" below 450, which would ease the conditions under consideration, give us a little in hand against contingencies, and, at the same time, fall in line with some 28 Scottish undertakings declared at 420–430 B.Th.U.

Although our authorization did not require individual notice to be given to consumers, certain industrial users were so advised, where burners adjusted to fine limits were in operation, and the reduction was then carried out over a period of three days, following which no single complaint was received.

It would be interesting to know what results have been obtained in Edinburgh since the declared calorific value was reduced to 450 B.Th.U., and perhaps Mr. Jamieson will tell us the quantity of benzole extracted per ton of coal, the average calorific value of unstripped coal gas, and the average therms per ton obtained at this value over the period since the reduction in declared value came into operation. It is realized that coals will have differed both in quality and type, but in spite of this, or possibly because of this, the figures will be none the less useful.

I agree with the Author that it would be a fine gesture of unity in Scotland, and a leading gesture to the Industry in general, if one standard of 425 B.Th.U. could be adopted; but I suggest this would require to be qualified to include only those undertakings having (*a*) vertical retorts, (*b*) horizontals with water gas or producer gas, and (*c*) total gasification. To maintain a declared value of 425 B.Th.U. from horizontals alone would present difficulties.

Mr. **R. D. Keillor** (Greenock): Those of us who have been manufacturing comparatively low C.V. gas for many years in continuous verticals are aware of advantages of an indirect nature such as (1) the reduction in capital and maintenance expenditure on coal and coke handling plant, and (2) the facility with which a proportion of straight or lightly carburetted B.W.G. can be admixed without materially affecting the specific gravity or chemical composition of the mixed gas. It is well known that the wartime tendency toward lower calorific values reduces the tonnage of coal required for gas making and thus eases the burden on British sea and rail transport. This aspect might well be kept in mind during the present discussion, as it should command equal attention in the postwar period when our economic position will to some extent be governed by our ability to export large tonnages of coal, and the many articles whose manufacture depends, at one stage or another, on coal being readily available.

Mr. **A. C. Rea** (Bath): The final C.V. chosen by any works is largely dependent on the coal available. Take our own case at Bath. Prewar, mostly local coals were used and in horizontals a gas of 500–510 was made. Water gas was used to get the 480 declared value. To-day we are forced to take Midland, Yorkshire, Durham, and a little Welsh. With many of these coals our C.V. gets above 550 and we dare not carry an excessive pull for fear of stopped ascension pipes, as these coals carbonize in about 10 hours compared with 12 for Somerset. Then, again, the economic balance between using carburetted water gas as a diluent must be borne in mind. These days of no option in coal selection may not therefore be a very suitable time for deciding on future declared value for gas until we know if a free choice of coals will be available after the war.

Mr. **W. Masterton** (Edinburgh): A feature of the Paper which particularly interests me is the fact that the Author finds the distribution of a lower grade gas has not given the trouble that was anticipated. Doubtless this is due, as he suggests, to the distribution system being of sufficient capacity not to be affected, but even if the D.C.V. were further reduced I believe the distribution system could take it and that only burner adjustments would be necessary.

In the re-planning of the Gas Industry which is under contemplation a new vision is necessary. The problem is, What use is the Gas Industry to make of coal?" In answering this question I submit that we have to keep one purpose in view, first, last, and all the time, and that is, starting with coal, to turn out products which will give us heat, light, and power without any pollution of the atmosphere either by smoke or by sulphur.

One feature which is hopeful is the fact that there is promise of a gas-electricity *rapprochement*. No longer must we hear from the electrical side that electricity will oust gas, nor from the gas side that gas can do everything better than anything else can do it. There are certain spheres in which the one is decidedly superior, and other spheres in which the other is the obvious correct agent. I think it probable that sooner or later the actual works of these two industries will be accommodated side by side on the same site to their mutual advantage.

Approaching our problem with this frame of mind there seems to me to be two broad avenues of approach : (1) Totally gasify the whole coal supply and supply purified gas to the electrical undertaking as well as to the town; (2) practise carbonization as at present understood, a high quality gas going to the town supply and the whole of the coke produced going only to the electricity undertaking, which would practise electrostatic precipitation of sulphuric acid from the chimney gases.

Mr. **J. H. Fulton** (Paisley): The quality of gas which each gas undertaking should produce is that which gives the lowest cost per therm at the consumers' burners. This does not necessarily mean that the quality selected will have the lowest production costs—for, although there is a tendency for production costs to fall with reduction in calorific value, the distribution costs may tend to increase, as increasing volumes of gas require to be handled in order to deliver the same number of therms to the consumer in a given time.

I agree with Mr. Jamieson when he suggests that coke should be kept in its proper position, as a by-product, and that our object should be to produce the maximum yield of gaseous and liquid therms, consistent with a low thermal cost to the consumer.

No real case has yet been made for the declaration of a universal standard calorific value of gas. That limitation of declared values is necessary is, I submit, proved beyond doubt. Selected values (probably within the range 475 to 400 B.Th.U.) might be applied to areas, but one universal value for the whole country does not appear at present to be an economic possibility.

Mr. **W. C. Campbell** (Galashiels): From a variety of opinions expressed by Mr. Jamieson in his Address we are entitled to infer that he is prepared to advocate a policy of supplying what may be termed low grade gas if circumstances were such that it could be produced and distributed more economically than gas of higher calorific value. Mr. Jamieson gives over the largest part of his Address to a reiteration of statements and opinions, some of which, though expressed no less than twenty years ago, apply to present-day problems and still provide food for discussion and thought. It is indeed unfortunate that the problems of 1920 should still be the problems of to-day, and this is in no small measure due to the fact that carbonizing practice has to all intents and purposes remained static during the period, and consequently carbonizing results, production efficiency, and costs are very similar to-day to those achieved twenty years ago. Cost of raw material and financial returns from residual products still exert considerable and varying influence on cost of producing gas; to my mind this is to be deplored, and I further regret that little progress has been made in devising ways and means of eliminating these influences.

It seems to me, therefore, that the question of calorific value is closely bound up with the effect of resultant residuals produced, the output of which should at least be restricted in such a manner to satisfy requirements of economical consumers, and thus contribute towards maintaining stable market conditions.

Our business to-day as an Industry is to make gaseous fuel, as economically and efficiently as possible, to deliver it in suitable condition and in adequate quantity to the point of use, to design and service the necessary appliances and equipment in which it is to be used, to exploit new fields of use, and to compete successfully with other forms of fuel. Not an insignificant task as you will agree, and yet we continue to complicate the issues involved and divert our minds with the production of solid and liquid fuels, the preparation for market, and selling thereof. Coke, to my mind, dressed up and called by any other name you like, only exists as a marketable fuel by reason of the effort we make to sell it. Normally it sells at a price much higher than its proper value, and, even so, I often wonder if it bears its full share of production costs. Furthermore, it has always appeared to me that the cheapest therms we sell are those which leave the works in tank-cars. I should therefore like to see the scientific efforts of our Industry diverted to seek ways and means of converting our not unlimited resources of gas-making fuel into gaseous therms irrespective of what the resultant calorific value of gas produced would be. I hope in my time to see the process carried out in one stage in one plant, and when someone solves the problem of how to make cheap oxygen in a gas-works, then the problem of how to convert all thermal units in the raw fuel into gaseous therms will, I imagine, be well on the way to the solution. I am sure we all appreciate the beneficial results obtained from the introduction of vertical retorts, and I cannot imagine what the position would be to-day if we all carried out the process of gas-making in horizontal retorts. The general introduction of vertical retorts took place after the last war, and I think we will find it necessary to make a further advance in carbonizing practice immediately after this war.

The wide variation in gas charges will also require to be eliminated, as it is surely unfair and uneconomic that gas prices should vary throughout the country. Amalgamations and co-ordination of undertakings may prove successful to a degree, but not until the production of coal, our greatest national asset, is taken out of the hands of private control and private profit-making thereon eliminated, can we expect

YESTERDAY, TO-DAY, AND TO-MORROW

to obtain our raw material at uniform price, thus removing the second varying factor. I think this means nationalization of Mines, Transport, and Gas Supply.

The Gas Industry needs a standard calorific value of gas, though some latitude in fixing the standard could be allowed as gas appliances are sufficiently flexible to overcome change in calorific value as demonstrated by recent sudden reductions therein throughout the country. The advantages of limited standardization are well known, and I would remind you of the success resulting from the standardization of electrical supply.

The Gas Industry does not want standard calorific value. As Mr. Jamieson has shown, the Gas Industry has been confronted with the problem for the last twenty years, and yet has done nothing to overcome it. I want to make it quite clear that in my opinion a variety of calorific values is prejudicial to the best interests of the Industry, taken as a whole, in that it creates circumstances whereby individual undertakings can profit from geographical location and so defeat that desirable and necessary feature—*viz.*, nationalization of supply. At present individual undertakings are allowed to determine their own policy and fix the calorific value of gas they will supply, having regard only to local circumstances. Co-ordination of policy from a national viewpoint is therefore essential. Will 400 B.Th.U. be the ultimate standard? I think Mr. Jamieson answers this question himself when he states, "One B.Th.U. is as good as another. There is no point in making low grade gas unless it can be produced and distributed more economically than gas of higher calorific value."

The Author's Reply

Mr. **Jamieson** in reply, wrote: Analyzing the remarks made by the speakers there appears to be agreement on the undernoted points:

(1) A universal standard quality of gas is not necessary.
(2) Consumers' requirements in Scotland are met with gas of 450 to 400 B.Th.U.
(3) Existing appliances respond efficiently to a rise or fall of 25 B.Th.U. in the calorific value.
(4) Benzole if extracted should be at the expense of the declared calorific value.
(5) Coke, although a more efficient fuel than coal, possesses all its disadvantages in use.
(6) Total gasification with the elimination of coke and the expensive machinery, plant, and labour needed for its preparation and handling has attractive possibilities.

With these views I am in substantial agreement, but I anticipate in the post-war development of the Industry that regional grouping and amalgamations with gas supplied in bulk will be the ordered arrangement. For that reason a standard quality of gas will be necessary. That standard may be 400, 425, or 450 B.Th.U.

Total gasification plant to produce either of these qualities economically is not yet available, nor is it likely to be so in the immediate post-war years. The coke issue, therefore, much as we dislike it, must be faced, and it is our immediate task to see that it is produced and marketed in such a way that it will contribute a much larger share of the production costs of gas than it has done in the past.

Mr. Melvin mentioned that the recent change in the calorific value in Edinburgh from 475 to 450 B.Th.U. was made without any apparent effect on the consumers' requirements, and the previous alteration from 500 to 475 B.Th.U. gave similar results. He rightly concludes from these changes that one absolute standard calorific value is not essential for the standardization of appliances.

In reply to Mr. Athol Brown I suggest that size of works need not determine whether or not C.W.G. plant should be installed, as quite a number of comparatively small works have such plant. I had in mind, however, post-war planning with the likelihood of centralization of production in large units. We installed continuous vertical retorts at Granton in preference to horizontal retorts on account of the demand from the Continent for a coke of high density and because of the limited supplies of suitable coking coals which are necessary for machine charging.

In my opinion (in normal times) too little attention is given to the selection of coals and too little thought to carbonization procedure. Retort temperatures as a rule are too low; if the retorts work without rodding and with little attention, all is well; if the coal is stubborn or sticky it is labelled as unsatisfactory or unsuitable, and there appears to be a reluctance to depart from the orthodox or generally accepted opinion that only certain classes and sizes of coal are suitable for continuous vertical retorts. During the last year Edinburgh supplied 500 B.Th.U. gas, 74.46 therms per ton of coal were produced, and for the first year at 475 B.Th.U. 82.26 therms, an increase of 10.5%. These figures may not be abnormal, but they do indicate that a reduction in calorific value is accompanied with a proportionate increase in the thermal yield, otherwise there would be no point in making the change. A mixture of broken coal with a fair proportion of sticky coals was used. Had doubles and trebles from the same collieries been used and the sticky coal withdrawn, a much lower thermal yield would have resulted. The retorts would have run easier and with less physical exertion on the operators, but I do seriously suggest that operating efficiency should be subordinated to carbonization efficiency.

What the recovery of one gallon of benzole represents in a reduced thermal yield in other undertakings I do not know, but in Edinburgh the year before we commenced benzole recovery we produced 82 therms and the following year 76 therms, a drop of 6 therms. That may be a high price to pay for the recovery of one gallon of benzole, but the facts must be faced, as notwithstanding the most careful examination of all contributory factors we have been unable to find any other reason for the reduction in the thermal yield.

Since we changed over from 475 to 450 B.Th.U. the estimated saving in coal has not materialized, but we have produced ¼ gallon of benzole more per ton. Investigations are in hand to ascertain the cause, but we are hampered by the changes in coal and irregular deliveries. Under existing conditions it is extremely difficult to explain or account for the extraordinary variation in the carbonization results returned from day to day.

COKE GRADING AND OXIDE PURIFICATION*

By KENNETH GRAHAM, *Dawsholm Gas-Works, Glasgow*

OF outstanding interest to Juniors is the recent Symposium of The Institution of Gas Engineers, in which various aspects of the Gas Industry were treated. There is, I think, a tendency to bring the declared value to something in the region of 450 B.Th.U. This may be due in part to the fact that lower calorific values are generally associated with higher gaseous thermal yields. Perhaps the most important item is that due to present-day conditions most works have been installing a benzole recovery plant; this has meant a consequent lowering of the calorific value. The saving of coal when the calorific value is reduced is another point which is more important now than in peacetime. These factors alone have speeded up this question of lower declared calorific values, and a change which might in normal times have taken a number of years has now taken place in a much shorter time.

Glasgow for the past two months has had a declared calorific value of 450 B.Th.U.; formerly the figure was 470.

At Dawsholm, owing to the flexibility of the plant, this has necessitated little or no change in the method of production, but has led to a considerable saving of coal. Strict control of the calorific value is maintained at the above works, and tests of the gas, as made, are done at two-hourly intervals on a Boys calorimeter which is fitted on the inlet main. Should the calorific value be above or below the standard, the necessary alteration is made by adjustment of the steam pressure to the continuous retorts. A Fairweather recording calorimeter gives a continuous record of the gas quality as supplied to the consumer.

Then there is coke grading and quality. The standardizing of coke quality presents many difficulties owing to the many types of coal used and the varied methods of carbonization. The buying of coal with a low ash content, and the careful supervision of same, with a view to eradicating stone, shale, &c., are first essentials towards the production of a good coke. Careful quenching or dry cooling enhance the quality and mean satisfied customers. Stricter plant control is another item requiring attention, and these points along with proper grading mean less poor-quality coke.

Coke grading is probably the most important of all. Most consumers will overlook other factors if they can obtain coke of the correct size to suit their requirements. Many complaints would never have arisen if the coke supplied had been uniform in size. The London and Counties Coke Association have for the past five years supplied six standard sizes of coke, and experience has shown that all consumers' requirements have been met. Prior to the introduction of this scheme, something like forty different sizes had been produced in this area.

Advantages were that the consumer obtained the size best suited to his needs and also this standardization brought about a more orderly position. It would appear, therefore, that fewer sizes are necessary, and this might lead to a more standard type of grading and screening plant, which in turn should bring down costs and make replacements much easier. In this connexion I would remind you of the Paper read by Mr. K. Sheard to this Association, in which it was shown that the standardization of benzole plant design had made for simplicity and had accelerated the time required for the manufacture and construction of the plant.

At Dawsholm the coke grading plant receives strict attention; all coke produced is stored in bunkers and is riddled only when required, and then directly into wagons, breakage after riddling being thus prevented.

There are two coke riddling plants at Dawsholm, one taking the coke from the continuous verticals and the other receiving coke from the intermittent verticals, the latter type of coke having been dry-cooled in the Sulzer plant.

There are two trommel screens, one within the other, which rotate in different directions. An improved delivery and cleaner material result from this arrangement. The following are the sizes separated:

* From a Presidential Address to the Scottish Junior Gas Association (Western District).

Wanted from TRANSPORT USERS

100,000 EXTRA WAGONS AND LORRIES TO BEAT THE BLACKOUT

THIS fact must be faced—long hours of blackout slow down transport dangerously. Yet the need for more wagons and lorries is vital—to carry men and munitions, food and fuel, to serve the many urgent needs of a nation at war.

We can't beat the blackout by making more vehicles; we haven't the labour, the materials nor the time to spare. The only solution to the problem is to speed up the running time of the wagons and lorries now in use. If, over the whole country, merely 15 per cent. were saved in loading and unloading time, the equivalent of no less than 100,000 extra vehicles would come into existence immediately.

Are you sure you are doing *your* share in getting a Quicker Turnround?

Ask yourselves these questions

1—Have you planned to make labour available to load or discharge immediately? Have you arranged to load to capacity?

2—Have you installed labour-saving equipment to speed up loading and unloading? If this is not possible, have you improvised?

3—Do you help consignees by informing them, as far as you can when the goods you forward may be expected to arrive?

4—Are your arrangements between your office and your loading staff as good as they should be? For instance, have you arranged for the immediate checking of loads?

5—Have you talked the matter over with the men who actually load and unload?

6—Do you make the most of every hour of daylight to clear loads, carrying on into the blackout when possible?

WORK FOR Quicker Turnround

SPEED UP LOADING AND UNLOADING

Issued by the Ministry of War Transport

Intermittent Vertical Coke.		*Continuous Vertical Coke.*	
Large Coke	Over 1¾ in.	Large Coke... ...	Over 1¼ in.
Eggs	1¼ in. to 1⅝ in.	Small Coke ...	⅝ in. to 1¼ in.
Coke Nuts	⅝ in. to 1¼ in.	Breeze	Under ⅝ in.
Breeze	Under ⅝ in.		

The Sulzer plant consists of two units, each having a coke cooling container, a waste heat boiler, and a gas circulating fan. The fan circulates the inert gases through the body of the coke in the cooling chamber, then through the waste heat boiler and back to the chamber. In this closed circuit the sensible heat in the coke is transferred by the gases to the raising of steam in the boiler. Normal routine is two hot skips of coke per hour to each unit. Cooled coke is discharged from the bottom of the container immediately before a skip of hot coke is put in, and in this way the coke is gradually worked down the containers. Hot coke is delivered to the unit at a temperature of about 1800°F., and is cooled to something like 400°F. The cooled coke is taken by bucket elevator to the coke storage bunker, from which it is screened and graded. Routine analyses of the circulating gases are taken to ensure that the gases are inert.

Some of the obvious advantages of this cooling system are:

(1) The production of a good dry coke.
(2) Recovery of waste heat by steam raising.
(3) Saving in water for quenching—this tends to produce less breeze.

On the other hand, fine dust from the coke is blown through the unit and its connexions by the fan; the dust is carried along with the circulating gases. Although dust boxes are provided and periodically emptied this dust tends to lodge in the boiler tubes, and in the ducts leading from the container to the boiler and from the boiler to the fan. This also necessitates cleaning of the fan blades and fan casing.

Dry Purification

At Dawsholm there are eleven sets of purifiers, each set having four boxes with a centre valve. There is no catch-box. Six of these sets are of the water lute type and work with one "off" box; the remaining sets are dry lute with no "off" box. The material used for purification is fresh oxide. It being no longer possible to obtain Dutch bog ore, which was formerly used, Irish bog ore is now used.

Having had considerable experience of Irish and Dutch natural oxides, my own preference is for the latter and for the following reasons:

(1) Dutch ore contains less free moisture, this partly due to the method of drying after the ore has been dug.
(2) Physically it is lighter and more porous, therefore easier to work and giving a larger surface exposure to the gas.
(3) Contains less fibrous matter and is generally more homogeneous.
(4) The percentage of active iron is higher, and this combined with the previously mentioned factors means better and easier working conditions.

All material is sampled on arrival at the works. The following are typical analyses:

	Dutch Bog Ore. %	*Irish Bog Ore.* %
Free H_2O	51·00	58·00
Organic Matter	7·43	8·50
Fe_2O_3	23·70	19·60
Insoluble matter (Silica, &c.) ...	5·07	5·90

After partial atmospheric drying the oxide is fined down and well mixed before filling into the purifier box; it then has about 35% free moisture. Backward rotation with downward flow is the system employed.

Each set under normal conditions is changed once per week, thus giving each box in the set the same period of time for sulphiding and revivification. Boxes are dug at regular intervals; each time a sample is taken to ascertain the water and sulphur content; the condition of the box is also noted. The oxide is used until it contains from 42–45% sulphur, when the box is emptied, refilled, and the set put in action on the same day. To help in the reactions and revivification a small amount of ammonia and air are admitted at the inlet to purifiers. The gas is passed through a Heston steam heater to give it a temperature of about 90°F. before admission to the boxes.

Discussion

Mr. **A. Shand** (Falkirk), Vice-President of the Association, said he was opposed to standardization. If this became complete, he thought it would not tend to better conditions. Lowering of C.V. was a debatable point for raising thermal yields, as high thermal yields were obtainable at 500 just as at 450 B.Th.U. per cu.ft. Continuing his remarks, Mr. Shand considered that the figure of 40 different sizes of coke for one area was exaggerated. He asked what the capacity of the coke bunkers at Dawsholm was, and were they made of steel or concrete. He thought that breeze up to ⅝ in. was, in many cases, too big. He asked Mr. Graham to give details of the methods used and the time taken to empty and refill boxes.

Mr. **Bateman** (Kilmarnock), regarding standardization of C.V., favoured the use of coals from pits situated nearest his own works, and consequently declared the C.V. to suit these coals. He agreed with Mr. Graham that coke sizes and names should be standardized, but believed that coke graded ⅝ in.–1¼ in. was too much varied in size. Referring to the Sulzer plant, he asked for the composition of the inert gases, and if putting off the boilers would be as well done by shutting down the plant, sealing the dampers, and allowing the boiler to cool instead of by the present slow cooling method. He sought information about trouble, if any, by scale on the tubes. Mr. Bateman said he had experienced no bother with Dutch ore, but this was not the case with artificial oxides, which had caused back-pressure difficulties. Irish bog ore was now in use in his works, and he was hoping for improvement with this over the artificial oxides.

Mr. **Smith** (Dumbarton) said that, in his opinion, standardization of C.V. would limit research, and considered it impracticable on a commercial basis. Furthermore, C.V. without control of specific gravity and pressure would avail nothing. He agreed coke grading was a step towards better coke sales, but only if the customers were educated in the uses of graded coke. Physical characteristics of coke were essential for efficient combustion, and the basis of good coke was good coal, and the cleaning of all coals was a job for the pithead, and not the gas-works.

Mr. **Fulton** (Paisley) said that the C.V. had been reduced by 25 B.Th.U. at Paisley, and he had found no increase in the thermal yield, or any saving in coal. He was interested in the suitability of operating a coke drying plant, as his experience had been that, after drying, coke had sometimes to be soaked again with water, to suit the needs of certain customers. He wished to know if the oxide was sold when it reached the sulphur content 42–45%.

Mr. **Dow** (Kirkintilloch) thought that a standard specific gravity was more important than a standard C.V. Referring to dry purification he asked Mr. Graham what temperature he had at the inlet to each box. He wished to know how many pounds of steam per lb. of coke were obtained from the drying plant, and how long the plant generally ran without being closed down for inspection.

Mr. **Greig** (Dawsholm) thought standardization was necessary in big cities with more than one works, and suggested that general standardization should be the aim. Referring to coke grading he mentioned that breeze removal before storage lessened the risk of fire, and would do this even if it necessitated debreezing again before loading into wagons. He said that it was beneficial to retain new oxide from the previous year's supply, to mix with the supplies for the current year. A blending of these could be used to maintain a certain standard of mixture from year to year, should the quality of one vary from that of the other.

Mr. **Kirk** (Motherwell, retiring President of the Association) said his idea was that if the coke market was good in a certain area, it was worth while producing primarily for coke. He believed that standardization of C.V. was still a long way off, and in many cases C.V. had to be increased where inadequate mains were in operation, although this was a very small factor against Mr. Graham's case. Although agreeing that saving in costs could be brought about by standardization in fittings, &c., he believed that it would also kill competition and research. He did not think importation of Dutch bog ore was necessary, as they would be able to produce a good artificial ore themselves—*e.g.* peat might be used in a mixture. He himself had a box filled with artificial oxide, and in operation for ten months he found no trouble with back pressure. He added that somewhere in the region of 400 million cu.ft. of gas had passed through the oxide during this period.

Mr. **Graham,** replying, said there appeared to be a divergence of opinion regarding C.V. standardization, yet those members opposing it in this respect looked for standardization in plant parts, appliances, &c. They did so because this meant generally a saving of time, labour, and money. He thought the introduction of some form of C.V. standardization would tend towards the same effect, and that wartime conditions made this a necessity. There had been little or no appreciable difference in the specific gravity of the gas at Dawsholm since the reduction of C.V. Regarding coke standardization he agreed that the names of the various sizes should be standard, as this would help consumers.

The Sulzer unit had an overhaul about every four months. The method given was for a complete overhaul, which necessitated removal of the coke from the container. A figure for steam raised was 1 lb. of steam for each 2½ lb. of coke cooled. A typical analysis of the inert gases was: CO_2 12·5%, O_2 0·6%, CO 4·1%.

Amplifying the remarks on Dawsholm purifying practice, Mr. Graham said the boxes were not emptied until the sulphur content reached 42%, but the oxide was dug and thoroughly mixed in the box at regular intervals. This digging counteracted back pressure and exposed a fresh surface to the gas stream. With fresh oxide the amount of iron which actually sulphided was what mattered. Each batch of fresh oxide was tested in the laboratory by fouling with H_2S, the available Fe_2O_3 being calculated. In the boxes one layer of oxide 22 in. deep was used. The amount of fresh oxide used for filling varied with the size of the box from 30 to 35 tons. This meant a figure of 50 to 60 tons of spent oxide when emptying. The spent oxide was shovelled on to a conveyor running from inside the box to receiving bogies outside. A box was emptied in 5 to 6 hours. Fresh oxide was filled into the box from overhead canvas chutes, and the purifier covers were replaced, this operation taking two to three hours. The set was then put to work. The gas temperature at the inlet to the boxes was in the region of 65°F., and varied slightly with changes in atmospheric temperature. The plant had a purifying capacity of 10 million cu.ft. per day; sulphur other than H_2S in the gas leaving the purifiers averaged 8 grains per 100 cu.ft.

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Gas Products Prices

The London Market Jan. 19.

There is very little movement in the prices of Coal Tar Products, as many of the usual markets are no longer available and pitch/creosote mixture as a fuel oil has taken their place.

Pitch is still a nominal market, but for such quantities as are being sold the price ranges between about 45s. and 50s. per ton. Creosote is about 5d. to 6d. per gallon. With regard to refined tar the price for next season has not yet been definitely fixed and it is expected that this will come under a Direction to be issued by the Coal Tar Controller. Pure toluole remains 2s. 5d. per gallon under the Ministry of Supply Toluene No. 2 Order. Pure benzole is about 1s. 10d., 95/160 solvent naphtha is 2s. 5d. to 2s. 9d. and 90/160 pyridine remains about 13s. 6d. per gallon. All the above prices are *ex* Makers' Works. Naphthalene prices are unchanged and are in accordance with the Control of Tar Order 1941. The Order refers to maximum prices, and the figure for refined crystal naphthalene in 2-cwt. bags and 4-ton lots is £23 per ton delivered.

The Provinces Jan. 19.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 1s. 10d. (controlled by the Control of Toluene No. 2 Order, July 5, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 11d. to 1s. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 9d. to 1s. 10d. Creosote, *ex* works, in bulk, North, liquid and salty, 4½d. to 4¾d.; Scotland, 4½d. to 4¾d.; low gravity, 4½d. to 4¾d. Fuel Grade, 4d. to 4½d. Carbolic acid, 60's, 3s. 7½d. to 3s. 9d. Naphthalene, £15 to £20. Salts, drained, £6 to £6 10s.; whizzed 72°, £7 15s.; 78°, £9 5s. Anthracene prices fixed by Controller. Heavy oil: Unfiltered anthracene oil (min. gr. 1,080), 6d. to 6½d.; filtered heavy oil (min. gr. 1,080), 6½d. to 7d.; heavy anthracene oil gr. less than 1,080, 5¾d. to 6d.

*In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Tar Products in Scotland

GLASGOW, Jan. 17.

No change is to be recorded. Refined tar 4¾d. to 5d. home and 4½d. to 4¾d. per gallon export. Creosote oil: Specification oil, 5¾d. to 6d.; low gravity, 6½d. to 7d.; neutral oil, 6d. to 6½d. per gallon; all *ex* Works in bulk. Cresylic acid nominal. Pale 99/100%, 4s. 9d. to 5s. 3d.; Pale 97/99%, 4s. 3d. to 4s. 9d.; Dark 97/99%, 4s. to 4s. 3d. per gallon; all *ex* Works in buyers' packages. Crude naphtha 6½d. to 7d. Solvent naphtha: 90/160 grade 2s. per gallon and 90/190 Heavy Naphtha 1s. 9d. per gallon. Pyridines 90/160 grade 14s. and 90/140 grade 16s. per gallon.

Gas Stocks and Shares

Activity in Gas Stocks and Shares was again on a small scale last week and business was confined mostly to the stocks of the larger undertakings. Gas Light units and United Kingdom ordinary shares were in best demand and the former closed 3d. higher. Very few fixed interest stocks changed hands by reason of the continued scarcity of supplies. It will be noticed that after a long period of inactivity Imperial Continental moved up a point.

The following price changes were recorded during the week:

OFFICIAL LIST		
Barnet District Ord.	117—122	+2
Gas Light Units...	13/3—14/3	+-/3
Ditto 4½ p.c. Red. Deb.	102—105	+1
Imperial Continental	60—65	+1
Montevideo	63—68	+3
Severn Valley 4½ p.c Cum. Pref. ...	16/6—18/6	+-/6
South-Eastern 4 p.c. Pref.	12/-—14/-	+-/6
South Metropolitan 5 p.c. Red. Deb. (x.d.)	100—105	Jan. 12
South Suburban 5 p.c. Red. Deb. ..	98—103	+1
PROVINCIAL EXCHANGES		
Sunderland	111—112	−½

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En passant

Sweet are the uses of adversity ;
Which, like the toad, ugly and venomous,
wears yet a precious jewel in its head.

Shakespeare (As You Like It).

Illustration shows A. & M. Dry Test Meter. These are made in 40, 100 and 200 c.ft. sizes. The pointer shows the hourly rate by a minute's observation on the outer circle and 1 c.ft. in 100th parts on the inner.

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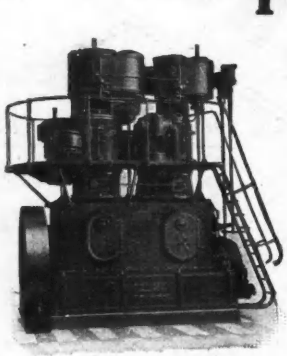

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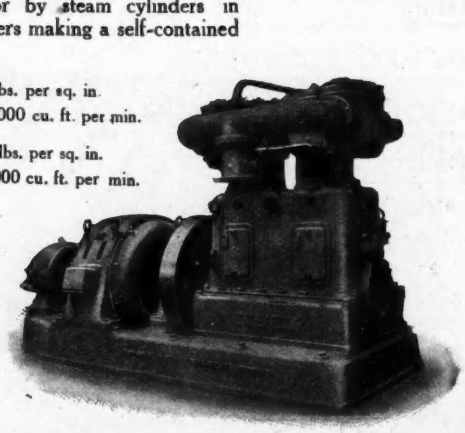

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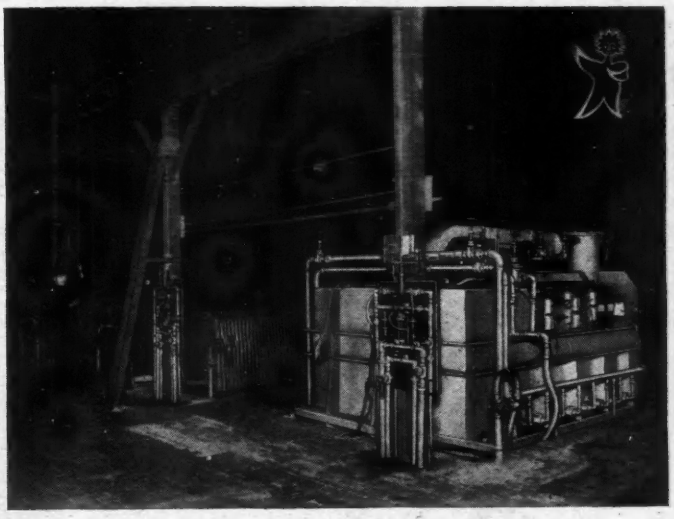

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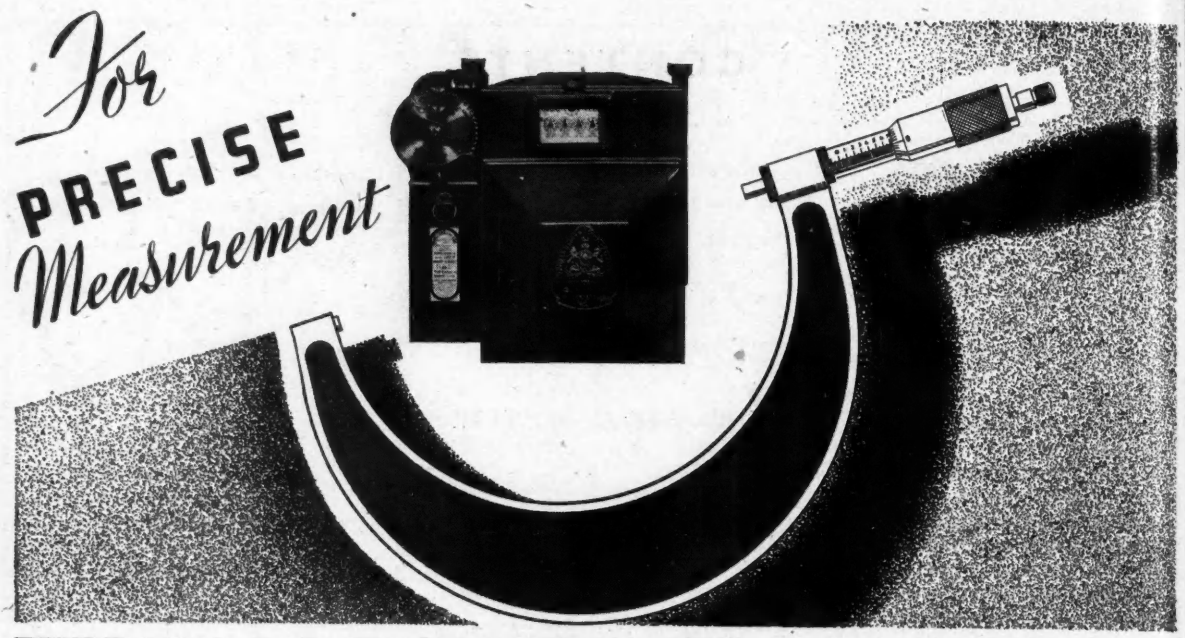

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